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PPP INFRASTRUCTURE DEVELOPMENT IN CHINA: CHALLENGES AND FUTURE TRENDS

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China is one of the fastest growing economies, which demonstrates a strong investment-led growth model to the world. Chinese central government has a strategic infrastructure plan to support its national economic growth and rapid urbanisation. They give high priorities and also provide huge amount of investments directly to build the infrastructure framework, such as national road network and the high speed train system. The massive development of physical infrastructure has resulted in sustained economic growth and increased international competitiveness. Similarly to the other countries, China has adopted PPP as an alternative public procurement tool to assist the infrastructure development effort. PPP delivers social and economic benefits that are crucial to future development. However, its size of output value is trivial if compared to total amount of public investment. The PPP system in China is still immature and the existing financial and institutional systems limit the PPP expansion. China is now in the transitional stage which aims to accelerate the private investment to the infrastructure development and it has been identified that PPP has a large potential to win the market. This paper reviews the development of PPP in China over last two decades, discusses the current challenges and its future prospects and concludes that the third wave of PPP development is coming.

Key words: China, Investment-led Growth, Infrastructure Development, PPP, Project Financing.

INTRODUCTION

China has moved from a centrally planned system to a more market-oriented system since the 'open door' economic reform started in 1978. In the last three decades, China has become one of the world's fastest growing economies (Demurger, 2001, Sahoo, *et al*, 2012). Gross domestic product (GDP) in China has increased from 7.5% between 1970 and 1999 to a double digit between 1999 and 2007 (Sahoo, *et al*, 2012). In the last three years, the GDP has maintained at around 8% (Sahoo, *et al*, 2012, NBSC, 2012).

The dominant economic growth model in China is investment-led model, while China is always keeping high proportion of urban fixed-asset investments such as infrastructure and real estate, which contributed around half GDP growth in 2000s (Ahuja and Nabar, 2012). The public infrastructure development is the main engine of China's investment-led growth. Literature stated that positive impacts of infrastructure development improve productivity, provide better investment

conditions, reduce the unemployment rate and also help China avoid the global financial crisis between 2007 and 2009 (Wang, 2010, World Economic Forum, 2010, Sahoo, *et al*, 2012) .

As an alternative procurement tool for the public infrastructure provision, Public Private Partnerships (PPPs) bring more private finance into public sectors as early as 1980s in China. China has developed a dynamic PPP market, where private sectors not just harvest gain massive benefits but some suffers pains as well (World Economic Forum, 2010). However, there is a significant lack of knowledge about a whole picture of the huge emerging market. The aim of this paper is to explore the development of PPP in China and analyse its unique characteristics and challenges facing. This paper will initially discuss the importance of infrastructure development for a rapid economic growth. It will also explore the different types of financial systems for infrastructure development in China. The following section assesses how PPP acted as an alternative procurement tool to support physical and social infrastructure development in China and its different development stages over past twenty years. It finally discusses the facing challenges and future prospects.

INFRASTRUCTURE PROVISION IN CHINA

The role of infrastructure, especially urban infrastructure, in enhancing economic development has been well documented both in the academic literature and in the policy debate (Aschauer, 1989; World Bank, 1994; World Economic Forum, 2010, and Ahuja and Nabar, 2012). Infrastructure development is the foundation of a modern society and plays a crucial role in determining the quality of life of individuals (World Economic Forum, 2010). There are varieties of infrastructure projects including urban public utilities (water supply and drainage, residential gas and heating supply, and public transportation), municipal works (roads, bridges, tunnels, and sewerage), parks, sanitation, waste management, and flood control, etc. Globally, it is estimated that there is a need of infrastructure investment of over US\$ 2 trillion each year over the next 20 years in the global market (World Economic Forum, 2010).

Over the past three decades, China's sustained high economic growth and increased competitiveness has been underpinned by a massive development of infrastructure (Chatterjee, 2005; Stephane, *et al*, 2007; Wu, 2010, and Sahoo, *et al*, 2012). Sahoo *et al* (2012) investigates the role of infrastructure in promoting economic growth in China and identifies that infrastructure development in China has positive contributions to the growth. The growing demand of infrastructure development is driven by pressures such as the country's massive urbanization, industrialization and privatisation programmes (World Economic Forum, 2010). The total amount of investment in urban infrastructure is around 14% of GDP. During 2006 and 2010 under China's 11th five-year plan, 1,250 billion Yuan (about US\$ 155 billion) were spent to develop a comprehensive railway and rapid transit system network by stretching 17,000 kilometres. The construction of road networks increased the total mileage by 0.4 million kilometres, including 24,000 kilometres of highway (World Economic Forum, 2010). During the recent global financial crisis, China has launched a large economic stimulus package of 4 trillion Yuan (about US\$586bn), the equivalent of about 7 per cent of the Chinese GDP focusing on infrastructure

development (NDRC, 2009). More recently, China has started to accelerate construction of urban public facilities by investing seven trillion Yuan (\$1.03 trillion) during its 12th Five-Year Plan from 2011 to 2015 (Roach, 2011).

Finance matters in the provision of urban infrastructure. Wu (2010) stated that infrastructure financing in urban China is fundamentally different from that of most other countries. In developed countries, borrowing is the main method to invest urban infrastructure (Chan, 1998). As a developing country, Chinese infrastructure investment was purely financed through the central government's plan committee during the pre-reform period. After the economic reform, innovative financing methods were introduced in addition to traditional fiscal allocation, such as bank borrowing, foreign direct investments and loans; grants or concessional loans from multilateral and bilateral agencies; holding funds in trust; bonds issued by central and local governments; and domestic and foreign capital markets (Wu, 2010). Funding from the government still dominates investment in infrastructure, but its stake has been declining in recent years. It is estimated that 80% from the government and the remaining 20% from the private sector (Ho, 2006). The extent of foreign direct investment (FDI) in infrastructure development has been very little, which accounts for less than 2% of the capital funds invested in infrastructure in 2006 (Sahoo, *et al*, 2012).

Although China generates massive investment in urban infrastructure development, however, because of rapid urbanisation, there is still an increasing gap between the potential demand and the available supply of infrastructure, the central government is under high pressure in direct budgetary spending, which must be filled by borrowing and market based financing.

PPP DEVELOPMENT IN CHINA

PPP has been seen as an effective solution to attract greater private sectors' participation in the development of urban development projects. PPP has been widely adopted by many countries because of its attractive characteristics to transfer risks to the private sectors, reduce public sectors administration cost, solve the problem of public sector budget restraint, provide higher quality public products and services, and save time in delivering the project (Li, *et al*, 2005).

The concept of PPP is not new in China. The private sector entered the traditionally government-controlled infrastructure sector in late 1980s. The first PPP (BOT) project is Shajiao B power plant in Shenzhen, which come to operation in 1998 (Ke, *et al*, 2009). It is now more than twenty years, PPP infrastructure projects has contributed to the national and local infrastructure development by providing investments, advanced technology, and management skills (Adams, 2006, Ho, 2006, Ke, *et al*, 2009, Yuan, *et al*, 2010, and Wang, *et al*, 2012).

Figure 1 illustrates the development of PPP projects from 1990 to 2011, where y axis is project number and x axis is the year. It clearly shows that the development of PPP can be divided into two stages (Wang, *et al*, 2012). The first stage is in 1990s, while Chinese PPP project is mainly financed and supported by Foreign Investors. At that

stage, most PPP projects used the BOT model and projects are mainly in Power, Water and Transport sectors. The '1997 Asian financial crisis' had severe negative repercussions on foreign direct investment (FDI) in infrastructure development in China. One of three BOT pilot projects, the Changsha Power Plant, failed to reach financial close because of the falling financing markets (World Economic Forum, 2010). As an effective countermeasure, the Chinese government increased public investment in infrastructure in early 2000s and provide some initial guidance for some PPP projects (Wang, *et al*, 2010). The second stage started in 2000s, market mechanisms have become mature. PPPs become one of the government's strategies for the provision of public facilities and services (Ho, 2006, Wang, *et al* 2012). In this stage, the most successful story is BOT toll road projects where the governments used PPP to pay off the initial cost and in return for a concession to toll the highway.

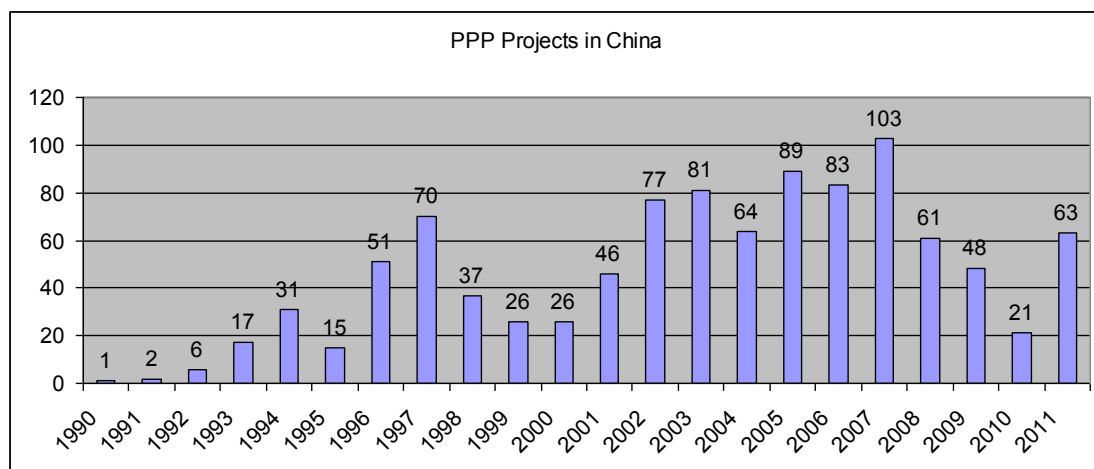


Figure 1: PPP projects in China year 1990 – 2011

Up to 2011, there are total 1018 PPP projects in China and the total capital value is US\$ 116.399 billion. Table 1 shows that PPPs could be mainly divided into 4 sectors: Energy, Telecommunication, Transport and Water. Transportation is the most popular sector for PPP implementation in both project number and total projects' capital value. Wang (2004) has classified Chinese PPPs into three distinct types – outsourcing, concession and divestiture and summarised 14 different modes of PPP in China. The most popular model is BOT, where the private sectors could directly collect the tariff from end users (Wang, 2004, Ho, 2006, Ke, *et al*, 2009, and Wang, *et al*, 2012). Recent years, the central government attempts to remove constraints to private-sector investment and promotes the development of public-private partnerships (PPPs) in other sectors such as social housing and sport stadium.

There are three key drivers for Chinese public sectors to adopt PPPs. The first driver is due to high rate of urbanisation which causes the high demand for basic public infrastructure and services. Rapid urbanization during China's reform period has resulted in a very high demand for basic urban infrastructure and the need for sustained mechanisms of financing (Chen and Doloi, 2008). The second driver is to relief government's fiscal pressure for infrastructure development (Ho, 2006, and Wang, *et al*, 2012). The third driver is the high saving rate of households and private finance. Chinese households have very high saving rate. The nation saves half of its GDP and its marginal propensity to save approached 60% during the 2000s (Ma and Wang,

2010). Private capital in China is totally 60 trillion Yuan (US\$9.49 trillion), including 35.2 trillion Yuan (\$5.57 trillion) of individual savings deposit and 25 trillion Yuan (\$3.96 trillion) of capital from private enterprises and other sources are ready for infrastructure investment (Lan, 2012). The Government must guide the private capital investment and build a sound and fair financing platform to improve the investment regulations in the infrastructure development.

Table 1: PPP Projects in China

| Sector | Project Type | Project No. | Capital Value (US\$ million) |
|-------------------|------------------|--------------|------------------------------|
| Energy | Electricity | 215 | 38,210 |
| | Gas | 194 | 4,480 |
| Telecommunication | Telecom | 4 | 14,518 |
| Transport | Airport | 17 | 2,555 |
| | Metro | 10 | 7,279 |
| | Highway | 138 | 26,221 |
| | Port | 65 | 13,400 |
| Water | Water | 36 | 3,922 |
| | Sewage Treatment | 339 | 5,813 |
| | Total | 1,018 | 116,399 |

PPPs have been implemented in the Chinese infrastructure market for many years; however, the impacts of PPPs are very limited in terms of project size, types and geographic locations. Most PPP projects are in developed areas in large cities such as Beijing, Shanghai, Guangzhou and east coast China; the western China's infrastructure heavily relies on solely financed by traditional fiscal allocation. Moreover, the projects are mainly physical infrastructure rather than social infrastructure such as hospital, schools, social housing or community centre, etc. The total output of PPPs is little comparing to total government spending. In 2011, the total public expenditure is 10,893bn Yuan, the total capital value of PPP projects is 2.3044bn, which is only 0.02% of the total public expenditure, but in the mature market e.g. UK, the PFI spending is around 10% of total expenditure, which shows that there is a large space for the PPP development in China.

CURRENT CHALLENGES AND FUTURE TRENDS

There are many risks and barriers to promote PPP in China, but there are four key challenges as described below:

- a) **Inadequate legal system:** in China, PPP implementation is lack of clear regulatory definitions and value-for-money (VFM) evaluation systems (Ho, 2006, Wang, *et al*, 2012). There is lack of a legislative framework to promote the PPPs in wider public sectors.

- b) **Lack of a support system:** most PPP projects in China are managed at provincial or municipal government by following sector's departmental guide. However, Wang, *et al*, (2010) argued that there is no organisation at national level in China specifically responsible for PPP projects, such as Partnerships UK or the National Council for Public Private Partnerships in the US. The establishment of the specialised agencies for PPPs is urgently needed to prepare the national PPP Guide and assist the PPP procurement process
- c) **Unbalanced partnership:** PPPs have been seen as a 'quick fixed' tool to reduce the government fiscal pressure, rather than consider it as an effective tool to improve the productivity. Nearly 30 years practice, the government has not fully recognised the private capital efficiency and better management skills in infrastructure development, and does not believe that private enterprise will shake the dominant position of the centrally planned economy in the supply of public goods. On the other side, private sectors are more focusing on short-term return without a spirit of long-term partnership (Ho, 2006). These factors cause inadequate risk allocation and transfer and do not help build a robust long-term partnership.
- d) **Lack of experience:** evidence found that the private sectors in China lack experience on the commercial, technical, legal and political aspects of PPPs (Ho, 2006, Wang, *et al*, 2012).

Although PPPs development in China is facing lots of challenges, but the demand and supply of PPP are relatively high. As the aforesaid three main drivers is increasing strong in China, the private sectors has over 60 trillion Yuan are waiting to invest. The urbanisation requests high demand of urban infrastructure and utilities. The government will evolve a deep financial reform to release more private capital entering the emerging PPP market.

CONCLUSION

China is the fastest growing country in the world for last three decades and accounts for nearly one fifth of the world population. The investment-led growth model in China relies on sustain infrastructure investment and development. However, the conventional budgetary allocation from central or local government is unsustainable and facing fiscal decentralisation. Public Private Partnership has become one of the important investment alternative tools to finance and deliver public infrastructures. While PPPs are not new in China, there is still a great potential for their application due to large amount of private capital, the high demand of urbanisation and in-depth fiscal system reform. PPPs in China are facing a series of challenges including inadequate legal system, lack of an agent support system, unbalanced partnership and lack of experience and knowledge. But evidences show that the third wave of PPP has started to take place, which will encourage the private sector to craft innovative project delivery approaches and offer the best value for money to the urban infrastructure development. It is important to make sure that both public and private

sectors stand on a fair position and build a long-term partnership in order to gain a win-win strategy for the social and economic development in long-run.

REFERENCE

Adams, J., Young, A., and Wu, Z., (2006) Public private partnerships in China system, constraints and future prospects, *International Journal of Public Sector Management*, Vol. 19 No. 6, 384-396

Ahuja, A., and Nabar, M., (2012) *Investment-led growth in China: Global Spillovers*, IMF Working Paper, International Monetary Fund, WP/12/267

Aschauer, D.A. (1989) "Is Public Expenditure Productive?" *Journal of Monetary Economics*, 23, 177-200.

Aschauer, D.A. (1989) "Is Public Expenditure Productive?" *Journal of Monetary Economics*, 23, 177-200

Chan, K. W., (1998) Infrastructure services and financing in Chinese cities. *Pacific Rim Law and Policy Journal*, Vol. 7, 503–528.

Chatterjee, S. (2005) "Poverty Reduction Strategies: Lessons from the Asian and Pacific Region on Inclusive Development," *Asian Development Review*, 22, 12-44.

Chen, C., Doloi, H., (2008) BOT application in China: Driving and impeding factors, *International Journal of Project Management* 26 (4): 388-398

Demurger, S., (2001) "Infrastructure Development and Economic Growth: An Explanation for Regional Disparities in China?" *Journal of Comparative Economics*, 29(1), 95-117.

Ho, H.K., (2006) "Development of Public Private Partnerships (PPPs) in China", *Surveyors Times*, Vol. 15, No. 10, October 2006, the Hong Kong Institute of Surveyors.

Ke, Y.J., Wang, S.Q., and Chan, A.P.C., (2009) Public-Private Partnerships in China's Infrastructure Development: Lessons Learnt, Pro. Of International conference on Changing Roles: New Roles and New Challenges, Edited by H. Wamelink, M. Prins & R Garaedlts, Published by TU Delft, Faculty of AREH, The Netherlands, Oct 5-9 2009 pp. 177-188.

Lan, X., (2012) A dream comes true: China is creating a fair, sound market environment for private capital. *Beijing Review*,
http://www.bjreview.com.cn/business/txt/2012-06/11/content_458647_2.htm
[Last visit: 06/01/2013]

Li, B., Akintoye, A., Edwards, P.J., and Hardcastle, C., (2005) Critical success factors for PPP/PFI projects in the UK construction industry, *Construction Management and Economics*, 23 459-471

Ma, G., and Wang, Y. (2010) *China's high saving rate: myth and reality*, BIS

NBSC (2012) *China Statistical Database Annual Data 2011*, (in Chinese), National Bureau of Statistics of China

http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20120222_402786440.htm [last visit: 05/01/2013]

NDRC (2009) More information about 4 trillion RMB stimulus plan (in Chinese) http://www.ndrc.gov.cn/xwfb/t20090309_26509.htm., National Development and Reform Commission

Roach, S.S., (2011) *China's 12th Five-Year Plan: Strategy vs. Tactics*, Morgan Stanley, 12th annual China Development Forum, Beijing, March 20-21, 2011.

Sahoo, P., Dash, R.K., and Nataraj, G., (2012) China's Growth Story: The Role of Physical and Social Infrastructure, *Journal of Economic Development* Vol 37, No. 1, 53-75

Stéphane, S., C. Vellutin, and M. Warlters (2007), "Infrastructure and Economic Growth in East Asia," The World Bank Policy Research, Working Paper, 4589.

Yuan, J.F., Skinbniewski, M.J., Li, Q., and Shang, J., (2010) The Driving Factors of China's Public-Private Partnership Projects in Metropolitan Transportation Systems: Public Sector's Viewpoint, *Journal of Civil Engineering and Management*, Vol 16, No.1 5-18.

Wang, S.Q., Ke, Y.J., and Xie, J., (2012) Public private partnership implementation in China, *Taking Stock of PPP and PFI around the world*, Edited by Winch, G.M., Onishi, M., and Schmidt, S., ACCA, Summary of Research Report 126

World Bank (1994) *World Development Report 1994: Infrastructure for development*, New York: Oxford University Press

World Economic Forum (2010) *Positive Infrastructure: A framework for revitalizing the global economic*, Geneva, Switzerland

Wu, W. (2010) Urban Infrastructure Financing and Economic Performance in China, *Urban Geography*, 2010, 31, 5, pp. 648–667